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The Parallax of B. D. +36° 3956

A former note (December, 1916) contains parallaxes of two of the three Wolf-Rayet stars for which Kapteyn and Donner have given values in the *Publications of the Astronomical Laboratory at Gröningen*, No. 1. For the third, B. D. +36° 3956, the result now derived from 20 exposures is:

$$\pi_{\text{rel.}} = -0.''005 \pm 0.''006$$

If we suppose that these three stars, which are close together in the sky, have the same parallax, the Mount Wilson results give a mean absolute parallax of +0.″0047; the absolute magnitudes of the stars would accordingly be +1.9, +1.4, and +1.4, or, in the mean, +1.6. If on the other hand we assume the stars to have the same absolute magnitude, we can derive the value +1.2 by means of a formula which is due to Mr. Strömberg.

For only ten other O-type stars are directly determined parallaxes by other observers available; the mean absolute parallax is −0″.007 and the mean apparent magnitude 6.55; these results also point to very high luminosities. From parallactic motions Gyllenberg derives an absolute magnitude of −1.2 for the O-type stars, and Hertzsprung obtains −2.8. From stream-motions Kapteyn has derived the absolute magnitudes of ten stars of this type: their mean value is −1.1.

A. van Maanen.

Absorption Lines in the Spectrum of Nova Aquilae, No. 3

This note contains the results of measures of the wide absorption lines or bands found in the spectrum of *Nova Aquilae* on a plate taken June 11, 1918, with the Mills three-prism spectrograph. Fifty-eight of these lines were measured by Dr. G. F. Paddock in the region including Hγ and Hβ. Wave-lengths in the International System were computed by a Hartmann formula. Finding that some of these wave-lengths agreed with titanium lines, under the supposition of a displacement of twenty or more angstrom units, in accordance with the shift announced by Adams and Joy,[1] a search for identification was undertaken. As many of the computed values agree with Lockyer's enhanced lines,[2] all of his tables of enhancing elements were compared with the Nova wave-lengths. Numerous identifications were found as follows:

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[1] *H. C. O. Bull.* No. 663.

[2] *Tables of Wave-lengths of Enhanced Lines*, Solar Physics Committee, 1906.

Twenty-four are found to agree with Lockyer's enhanced titanium lines and four others with titanium as given in Kayser's *Handbuch der Spectroscopie.*[1] Lockyer's strong line at 4338A is the only one of his strongly enhanced lines not found, and the region of this line in the Nova is confused with wide, hazy absorption. Lockyer's list of enhanced iron lines, which includes seventeen in the region covered by this plate, and Kayser's tables furnish correspondences for thirteen and three of the observed lines respectively. Four lines are included in the counts of both titanium and iron. Of the six more strongly enhanced chromium lines in Lockyer's list, five are found on this plate, one of which comes close to a line given in Kayser's tables for titanium. One chromium line whose intensity is omitted by Lockyer but given in Kayser as strongly enhanced is also present. Seven more computed wave-lengths agree with strong chromium lines, but two of these agree as well with iron and titanium. Lockyer's two enhanced magnesium lines are closely represented. No definite agreements are found with other enhancing elements. Altho a few wave-lengths of weak lines of thorium, nickel, and vanadium correspond to measured lines, and some lines of other enhancing elements come close to computed wave-lengths which are correlated with titanium, iron, or chromium, the strongest spark lines of these elements are all missing. Ten arc lines of manganese and many strong arc lines of iron and titanium correspond well with observed lines.

All of the lines thus identified show a general displacement toward the violet of 22 to 25 angstroms, and there is an indication of increase with wave-length. Between 4300A and 4400A the displacements average 22.3A; between 4400A and 4500A, 22.9A; between 4500A and 4600A, 23.3A; between 4600A and 4800A, 24.3A.

Out of the 58 absorption lines or bands measured, 48 are correlated with lines, mostly those subject to enhancement, of titanium, iron, chromium, and magnesium. This result gives satisfactory evidence of the presence of these elements in this Nova. The two lines at the end of the list are in the edge of the bright band of Hβ. For eight no acceptable correspondences can be given except arc lines as mentioned above.

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[1] *Handbuch der Spectroscopie,* Vols. 5 and 6.

Observed Wave-length	Identification			Displacement
4298.7A	Ti	s	L	22.5A
4303.2	Fe	s	K	22.6
4308.2	Ti	s	L	22.5
4319.3	Ti	s	L	22.2
4329.4	Fe	s	L	22.5
	Ti	s	L	21.6
	Cr	a, s	E&H	22.2
4336.1				
4345.9	Ti	s	L	21.9
4352.7	Ti	s	L	22.2
4361.3	Fe	s	K	22.3
4363.1	Fe	s	L	22.4
	Cr	a,s	E&H	22.0
4364.7	Ti	s	L	22.3
4372.5	Ti	s	L	22.7
	Mg	s	L	22.5
4377.7	Ti	s	L	22.2
4382.9	Fe	s	K	21.9
4394.4	Ti	s	L	23.5
	Fe	s	F	22.6
4421.2	Ti	s	L	22.8
4428.0	Ti	s	L	22.6
4437.2				
4439.5	Fe	s	L	22.8
4441.9	Ti	s	L	22.7
4445.6	Ti	s	L	23.1
4448.4	Ti	s	K	22.5
4458.4	Ti	a,s	K	22.9
	Mg	s	L	22.9
4466.0	Ti	s	L	22.5
	Fe	s	L	23.3
4468.5	Fe	s	L	23.1
4474.8	Cr	a,s	E&H	22.2
4478.6	Ti	s	L	22.8
4482.2				
4485.3A	Fe	s	L	23.2A
4488.9	Cr	a,s	E&H	23.2
4492.3	Fe	s	L	23.2
4497.3	Fe	s	L	23.1
4499.7	Fe	s	L	23.1
4510.7	Ti	s	L	23.4
4515.8				
4519.0				
4522.1	Cr	a,s	E&H	22.7
4526.4	Ti	s	L	23.4
	Fe	s	L	23.2
4532.3	Ti	a,s	K	23.2
	Fe	s	L	23.8
	Cr	s	L	22.9
4535.5	Cr	s	E&H	23.3
4540.4	Ti	s	L	23.5
4549.2	Ti	s	L	23.0
4560.4	Fe	s	L	23.6
4565.7	Cr	s	L	22.7
	Ti	s	L	24.4
4586.3				
4595.3	Cr	s	L	23.7
	Ti	a,s	K	22.0
4605.7	Fe	s	L	23.8
4610.0	Cr	s	L	24.2
4640.1	Cr	a	E&H	24.4
4643.1				
4647.0				
4738.6	Ti	s	L	25.4
4756.1	Ti	s	L	24.1
4765.8	Cr	a	K	24.
4781.2	Ti	s	L	24.0
4800.0	Cr	s	L	24.3
4825.8	edge of Hβ			
4838.8	" " "			

The list of the measured lines and their identifications as above described is given in the accompanying table, the abbreviations being: A = angstrom, a = arc, s = spark, Ti = titanium, Fe = iron, Cr = chromium, Mg = magnesium, L = Lockyer[2], K = Kayser[3], E & H = Exner and Haschek[3], F = Fowler[4].

LEAH B. ALLEN.

August, 1918.

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[2] *Tables of Weave-lengths of Enchanted Lines*, Solar Physics Committee, 1906.

[3] *Handbuch der Spectroscopie*, Vols. 5 and 6.

[4] *Monthly Notices*, Vol. 67, p. 156, 1906.